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NOTES ON THE HYDROBIINI (COLEOPTERA-HYDROPHILIDÆ) of BOREAL AMERICA

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The genera and species which were formerly included in the tribe Hydrobiini Lec. have been separated by Orchymont (Ann. Soc. Ent., France, 88, 1919, p. 136) into two subtribes: Hydrobiæ and Helocharæ, an arrangement which has been accepted by Alfred Knisch in his Catalogue of Hydrophilidæ, published by W. Junk, Berlin, 1924.

The following table and notes concerning our American species are arranged in accordance with this work, and are submitted with the hope that they will prove helpful to our students of these insects:

Maxillary palpi stout and short, little longer or shorter than the antennæ, last joint as long as or, as a rule, longer than the penultimate, last joint of tarsi shorter than the preceding ones united.....Subtribe *Hydrobiæ* Orch.

To it belong: *Crenitis*, *Crenitulus*, *Paracymus*, *Hydrobius*, *Hydrocylus*, *Anacæna*, and *Laccobius*. Type genus *Hydrobius*.

Maxillary palpi much slenderer than in the Hydrobiæ, much longer than the antennæ, last joint as a rule shorter than the penultimate (except in *Enochrus* s. str.), antennæ always nine-jointed

.....Subtribe *Helocharæ* Orch.

To it belong: *Helochares* (Muls.), *Enochrus* (*Philhydrus*), *Cymbiodyta*, *Helocombus*, and *Helobata* (*Helopeltis* Horn). Type genus *Helochares*.

Key for the separation of the genera of the subtribe Hydrobiæ Orch.

Elytra with sutural striæ, abdomen with five visible ventral segments 2

Elytra without sutural striæ, abdomen with six visible ventral segments, trochanters of hind legs enlarged, hind tibiæ curved *Laccobius* Er.

2. Species larger, longer than 5 mm., elytra striate or rows of punctures very pronounced..... 3

—. Species smaller, not over 3 mm. in length, elytra confusedly

- punctate or almost impunctate, never striate, at the most punctures subserially arranged..... 4
3. Head broader than long, præclypeus not visible, lateral margin of thorax and elytra even.....*Hydrobius* Leach
- Head longer than broad, præclypeus visible, lateral margin of thorax and elytra serrate emarginate.....*Hydrocylus* Sharp
4. Eyes protuberant, form oblong, subdepressed.....*Crenitis* Bedel
- Eyes not protuberant..... 5
5. Elytra narrowed posteriorly almost from the humerus, mesosternum slightly protuberant, hind tarsi united longer than tibiæ.....*Crenitulus* gen. nov.
- Form short and convex, tibiæ rather coarsely spinulose, hind tarsi at the most as long as tibiæ..... 6
6. Middle and hind femora densely pubescent, upper surface testaceous to piceous, never with a metallic luster.....*Anacæna* Thom.
- Middle and hind femora at most sparsely pubescent at base, disc always with a metallic luster.....*Paracymus* Thom.

Genus LACCOBIUS Er.

Only two distinct species are known to inhabit boreal America, and are easily separated:

- Punctures of the disc of the elytra arranged in distinct rows, form shorter and more convex.....*agilis* Rand.
- Disc of elytra confusedly punctate, form more oblong.....*ellipticus* Lec.

Male. Second and third segments of front tarsi broader.

Habitat. Along the sandy margins of lakes and brooks.

L. agilis Rand: Orono, Me. (Coll. Dodge); Riverton and Portsmouth, R. I.; Claremont, N. H. (Coll. Dow); Kissena Lake and Oakland Lake, L. I.; Woodstock, Vt.; Stony Point and Ardsley on Hudson, N. Y.; Totowa, N. J.; Fort Wingate, N. M.; Jemez Springs, N. M. (Coll. Sherman); Riverside, Cal. Doctor Horn records it from the middle states westward to California and Oregon.

L. ellipticus Lec.: San Francisco (Coll. Dodge), Camp Meeker, Santa Barbara, Santa Cruz Island (Doctor Horn), and Riverside, Cal.; southern portions of California, Arizona, and Lower California.

Genus HYDROBIUS Leach

- Alternate intervals of elytra with row of coarse punctures..... 2
- Alternate intervals of elytra without series of coarse punctures, elytra without trace of scutellar striæ.....*scabrosus* Horn

2. Elytra with well-marked striæ, form oblong.....*fuscipes* Linn.
- Elytra with rows of fine punctures, form short and convex..... 3
3. Posterior femora merely closely punctate near base, not opaque and pubescent.....*tumidus* Lec.
- Posterior femora densely punctate and pubescent near base and along the upper border.....*melænus* Germ.

H. fuscipes Linn. This is the type of the genus, and is to be found in the boreal as well as the nearctic regions. I have seen specimens from Flatbush, L. I., Tompkins Cove, Staten Island, N. Y., Hackensack, N. J., Woodstock, Vt., Richmond, Va. (Coll. Dodge), Lake of the Clouds, N. H., Stoneham and Swampscott, Mass., Orono, Me. (Coll. Beaulne), Ottawa, Ont., Pullman, Wash., Santa Barbara and Riverside, Cal. It is common in standing waters from early spring to fall.

H. tumidus Lec. Of this apparently rare species I have seen only the specimens in Mr. Leng's collection from Staten Island, N. Y., and the one in my own collection from Mineola, Long Island, N. Y., caught in a stagnant pool underneath a half-submerged log. Doctor Horn records it from New York to Florida; Blatchley from Marion County, Ind.; Leng and Mutchler from Crescent City, Haw Creek, Bartow and Jacksonville, Fla.

H. melænus Germ. This species is better known as *globosus* Say, but Germar's name has priority as proven by Orchymont in the Ann. Soc. Ent., France, 88, 1919, p. 137. It is abundant in the eastern states and seems to prefer running water. It may be found throughout the summer. I have seen specimens from Brooklyn, N. Y. (Coll. Shoemaker), Yonkers, N. Y., Catskill Mountains, N. Y. (Coll. Angell), Staten Island, N. Y. (Coll. Davis), Ardsley on Hudson, Tompkins Cove, N. Y., Massachusetts (Coll. Dodge), Haldon, Tatowa, N. J., Ash Grove, Pa. (Coll. Davis), and Richmond, Va. Mr. Blatchley records it from Mitchell, Lawrence County, Ind. According to Mr. Richmond (Bul. Am. Mus. Nat. Hist., 42, 1920, p. 52), its egg cases are more frequently found in moss or in mud at the shore line and usually entirely concealed except for the cap end, while those of *fuscipes* are attached to floating vegetation away from the bank. The larvæ of both of these species are carnivorous and very much alike.

H. scabrosus Horn. This species is not a typical *Hydrobius*. Further studies based on more material (I have seen only a single specimen, from City Canon, Utah, kindly given me by Professor Fall) may prove that it belongs in a distinct genus. Its head is more oblong than that of a true *Hydrobius* and less so than in *Hydrocyclus*, the coarser serial punctures of head and thorax are absent and the clypeus is emarginate. The thorax is not evenly convex, but has a vague depression in the center and on each side about one-third the distance from the lateral margin at base, and but a vestige of the sculpturing so well marked in *Helophorus*. Elytra with ten moderately deeply impressed striæ, scutellar striæ entirely absent, disc vaguely depressed each side of suture near apex, sixth dorsal interval more convex, seventh, eighth and ninth narrower and depressed, tenth much wider, more convex with the outer margin slightly inflexed. When viewed from beneath part of the flank is visible apically. There is also a marked difference in the tarsi which are round, not laterally compressed, and much narrower and cone-like at base. The second joint of the hind tarsi is, by comparison, shorter than in typical *Hydrobius* and similar in its relative proportions to that of *Hydrocyclus tessellatus* Ziegl., with the last tarsal joint longer and club-shaped. It occurs at Ketchikan, Alaska (Professor Fall) and extends as far south as San Francisco (Doctor Horn).

Genus HYDROCYCLUS Sharp

The type of the genus is *Hydrocyclus lacustris* Sharp, a Japanese species described in the Trans. Ent. Soc., London, 1884, p. 451. Mr. Alfred Knisch (Entom. Anz. Jahr. 1, 1921, pp. 99-102), added two more species and included our *H. tessellatus* Ziegl. The main characteristics of *Hydrocyclus* are: head more oblong than in *Hydrobius*, clypeus emarginate, præclypeus visible, serial punctures on head and thorax wanting, maxillary palpi longer, lower lateral margin of thorax and elytra serrate emarginate, not entire as in *Hydrobius*, prosternum carinate, tibiæ, pubescent, at least on basal half, tarsi round, not laterally compressed, conical or narrower at base, and last joint of hind tarsi longer and club-shaped.

Two species which have formerly been included under *Hy-*

drobius, are known to occur in our fauna and may easily be separated as follows:

- Color pale castaneous, disc of elytra with dark brown markings,
 alternate intervals of elytra more convex and smooth.....
*tessellatus* (Ziegl.)
- Color piceous, elytral intervals equally convex, finely scabrous.....
*latus* (Horn)

H. tessellatus (Ziegl.). According to Mr. Leng (Ins. of Fla., 1918, p. 111), this species is found clinging to the underside of submerged logs. A full-grown larva was taken by Mr. Schwarz among some leaves caught in roots of a tree near the margin of a swiftly flowing stream. Mr. Richmond found it to be quite tuberculate, closely resembling the larvæ of *melænus*. I have seen specimens from Bladensburg, Md., Eatontown, N. J., and Westwood, N. J. (Coll. Sherman). Mr. Leng records it from Centerville, Fla. (Roberts Coll.), and Doctor Horn gives its distribution as from Canada to Florida.

H. latus Horn. I have only one specimen of this species before me, collected by Doctor Fenyes at Castle Crag, Calif., and presented by Professor Fall. The scalloped lower margin is more distinct at the anterior half of the thorax and the apices of the elytra.

Genus CRENITIS Bedel

This genus differs from *Anacæna* and *Paracymus* by its oblong subdepressed and more parallel form, the horizontal epipleuræ of the elytra, the more convex and protuberant eyes, its slender legs and tarsi, the finely spinulose, tibiæ, hind tarsi together as long as tibiæ, and mesosternum not carinate. This genus seems to be confined to mountainous regions only.

Type *Crenitis punctatostratus* Letzn.

Our species may be separated by the following table:

- | | |
|---|-----------------------|
| Antennæ nine-jointed..... | 2 |
| Antennæ eight-jointed..... | 3 |
| 2. Thorax with a pale border, not alutaceous, posterior femora punctate and finely pubescent at basal two-thirds..... | |
| <i>dissimilis</i> (Horn) | |
| —. Thorax entirely piceous, with head and thorax alutaceous, hind femora faintly strigose | <i>moratus</i> (Horn) |

3. Elytra brownish testaceous, femora pubescent....*monticola* (Horn)
- Elytra piceous, brown side margin of thorax not extending apically, shining, not alutaceous, legs rufo-brunneo-testaceous.....*longulus* (Fall)
- Piceo-testaceous, head and thorax finely alutaceous, side margin of thorax extending apically, femora piceous, basal half punctate and sparsely pubescent.....*alticola* (Fall)

C. dissimilis (Horn). Six specimens collected by Mrs. Winters at Camp Meeker, Cal., are in my collection. Doctor Horn records it from Oregon and as far south as San Francisco.

C. moratus (Horn). This species is unknown to me. Doctor Horn's specimens were collected by Mr. Strumberg in Utah.

C. monticola (Horn). I have seen specimens from the White Mountain region of New Hampshire (Mr. Leng's collection), Woodstock, Vt., in the débris of a mountain spring and the Catskill Mountains, N. Y. (Coll. Nicolay).

C. longulus (Fall). This species was taken at Mitchell, Ind., July 16, 1910, and was described by Professor Fall as a *Paracymus* (Journ. N. Y. Ent. Soc., Vol. 32, 2, June, 1924).

C. alticola (Fall). This species was collected by Mr. J. O. Martin at Tioga Pass, Sierra Nevada Mountains, Cal., altitude 10,000 feet, August, 1924. I collected one specimen at the overflow of Sheffield reservoir, Santa Barbara, May, 1925, but was unable to find any more, in spite of a most careful hunt. The maxillary palpi in the specimen before me are stouter than in *monticola*, with the second joint very robust.

Genus *Crenitulus* Winters, new genus

Eyes not protuberant, elytra narrowed posteriorly almost from the humeri, mesosternum slightly protuberant, tibiae finely spinulose, first joint of middle and hind tarsi much shorter than second, hind tarsi longer than tibiae.

Type *Crenitulus suturalis* (Lec.).

This genus differs from *Crenitis* by its unique form, less convex and nonprotuberant eyes and minutely punctate elytra; from *Paracymus*, by its unique form, finely spinulose tibiae and slender tarsi, as well as by its shining piceous elytra.

Cr. suturalis (Lec.). Doctor Horn records this species as extending from Canada to Georgia; Leng and Mutchler from Punta Gorda, Titusville, and Lakeland, Fla.; Hubbard and

Schwarz from Enterprise, Kissimmee and Tampa, Fla.; while I have it in my collection from Tatowa, N. J., July; Oakland Lake, Long Island, N. Y., June; and Richmond, Va., June.

Genus ANACÆNA Thoms.

This genus differs from *Crenitis* by its shorter, more convex and globular form, nonprotuberant eyes, vertical elytral epipleuron, confusedly punctate, never subserially arranged, elytra, shorter and coarsely spinulose hind tibiæ; and from *Paracymus*, by its brownish to black color without any metallic luster and densely punctate and pubescent hind femora. Two species have been recorded from our fauna which I believe to be identical with those of the palearctic fauna.

Clypeus and last joint of maxillary palpi piceous, thorax piceous, indefinitely paler at the side.....*limbata* (Fab.)
Clypeus in front of each eye testaceous, last joint of maxillary palpi testaceous at base, tips piceous, thorax variegated, the piceous confluent markings separated near base by two lighter spots.....*bipustulata* (Marsh.)

A. limbata (Fab.). This species known to American students as *infuscatus* Motsch. is found among leaf mold in standing water, and is one of our most common *Hydrophilidæ*. Doctor Horn records it from Oregon to San Diego, eastward to Wyoming and Michigan, and thence south to New Mexico. I have seen specimens from Orono, Me., Swampscott, Mass., Nahant, Essex Co., Mass. (Coll. Dodge), Ottawa, Canada (Coll. Beaulne), Cape Breton, Nova Scotia, Bridale, Conn. (Coll. Davis), Woodstock, Vt., Kissena Lake, L. I., Hackensack Swamp, N. J., Ardsley on Hudson, N. Y., Santa Barbara, Riverside and Camp Meeker, Cal.

A. bipustulata (Marsh.). Ent. Brit. I, 1802, p. 406 (*Hydrophilus*). This is a Mediterranean species which looks to me like *A. signaticollis* Fall, which was only recently described by Professor Fall (New Species N. A. Hydrobiini, Journ. N. Y. Ent. Soc., June, 1924, p. 87). It has never been recorded from the East, but is quite frequently found in running streams in southern California and New Mexico. I have seen specimens from Jemez Springs, Fort Wingate, N. M., Santa Barbara and Riverside, Cal.

A. globulus Payk. This species was sent to me by Professor

Chamberlain, Cornwall Bridge, Conn., in January, 1921, for identification. It was found in imported nursery stock from Ireland received March 1, 1911, by B. H. Welden, and is only mentioned as an interesting fact and for purposes of record.

Genus PARACYMUS Thoms.

This genus is easily separated from *Anacæna* by its metallic luster and sparsely punctate and at the most sparsely pubescent hind femora.

Prosternum distinctly carinate.....	2
Prosternum absolutely simple.....	9
2. Elytra alutaceous.....	3
— Elytra shining.....	5
3. Antennæ nine-jointed, form globular.....	<i>despectus</i> (Lec.)
— Antennæ seven-jointed, form oval.....	4
4. Punctuation of elytra hardly discernible.....	<i>degener</i> (Horn)
— Punctuation of elytra relatively coarser with mesosternal keel less developed.....	<i>reductus</i> (Fall.)
5. Antennæ eight-jointed.....	<i>subcupreus</i> (Say)
— Antennæ seven-jointed, mesosternal protuberance very pronounced, almost laminiform.....	6
6. Prothorax and elytra with sharply defined pale margin which is broader behind.....	7
— Prothorax and elytra suffusedly paler at sides.....	8
7. Punctuation fine and sparse (California).....	<i>elegans</i> Fall
— Punctuation coarser and closer (Alabama).....	<i>lodingi</i> Fall
8. Punctuation of elytra fine and sparse.....	<i>ellipsis</i> Fall
— Punctuation of elytra relatively coarser.....	<i>nanus</i> Fall
9. Head and thorax alutaceous, mesosternum with a slight tubercle (Eastern).....	<i>digestus</i> (Lec.)
— Head and thorax shining, mesosternum plane.....	<i>rufiventris</i> (Horn)
	<i>seriellus</i> Fall

P. despectus (Lec.). This appears to be a rare species. Its alutaceous upper surface makes it closely resemble *P. degener* (Horn), and I believe that it is often confused with it, but it is shorter and has a more globular outline, its mesosternum is less protuberant and it has nine-jointed antennæ. I have only one specimen, from North Beach, Long Island, N. Y., before me. Doctor Horn gives its distribution as: Massachusetts, Pennsylvania, Michigan, and Illinois.

P. degener (Horn). This species, according to Doctor Horn,

has nonpunctate elytra, but the series before me proves that statement to be incorrect. While the punctuation is extremely fine and variable, it is discernible with a high-power lens. It seems to occur quite commonly in Florida. My specimens were collected by Mr. Davis at Everglade, Fla., April to May.

P. reductus Fall. The typical form of this is unknown to me, but I believe that it is only a form of *degener* with the punctuation more pronounced.

P. subcupreus (Say). This is a very widely distributed species inhabiting most likely the entire nearctic region. It varies in size. In the California form the front claw joint is stouter in the male, but I am unable to find any other characters that would separate it from eastern specimens, a fact which was also noted by Professor Fall (Cal. Acad. Sci., Occas. Papers, 8, 1901, p. 218).

P. elegans Fall. This is unknown to me. It was described by Professor Fall from specimens taken in a salt pool at Redondo, Cal.

P. lodingi Fall. This species is easily recognized by its coarse punctuation and well-defined pale border. One specimen was kindly given to me by Mr. Schæffer which was collected by Mr. Loding at Mobile, Ala.

P. ellipsis Fall. This was described from specimens collected by Mr. Schwarz at Hot Springs, Ariz. I collected three specimens at the Arrowhead Hot Springs, Cal., in July.

P. nanus Fall. I believe this to be a distinct species. Specimens are before me from Lakeland, Fla., and South Bay, Lake Okeechobee, Fla.

P. digestus (Lec.). This species occurs in mountain streams. My specimens are from Tompkins Cove, N. Y., Ardsley on Hudson, N. Y., Catskill Mountains (Coll. Nicolay), and Cornwall, Mass. (Coll. Chamberlain).

P. rufiventris (Horn). According to Professor Fall, this species is more convex and with the outer rows of punctures less pronounced than the following. I have four specimens before me from Jemez Springs, N. M., that were given to me by Mr. Sherman.

P. seriellus Fall. Four specimens from Camp Meeker, Cal.,

are before me, which seem to agree with Professor Fall's description of *seriellus*. While this species and the last seem to differ as regards their convexity, I am unable to find any specific characters to separate them.

AN INTERESTING NEW BEE FROM CALIFORNIA

BY T. D. A. COCKERELL

Bombomelecta callura Cockerell, n. sp.

Male. Length about 14 mm.; robust, black, with rather short and obtuse scutellar spines; antennæ entirely black; flagellum thick, but not excessively so; third antennal joint not conspicuously longer than fourth, fourth about as long as broad; clypeus, front and occiput with long white hair, sides of face and cheeks with long black hair; thorax above with cream-colored hair except for a large median patch of black hair which does not extend to tegulæ; mesopleura with dull white hair, but long black hair on sides of metathorax; tegulæ black; wings brownish; second cubital cell very narrow; third cubital bulging excessively on outer side; hair of legs largely black, but long white hair at end of anterior femora beneath; middle tibiæ densely clothed with white felt-like hair on outer side, hind tibiæ with white hair anteriorly at base and apex (most at base); hind basitarsi above with thin white hair, and small joints of all tarsi with more or less pale hair; first abdominal segment clothed with long creamy-white hair, but some black along apical margin; remaining segments with black hair, but third to sixth each with a pair of large rounded spots of dense white tomentum, these spots altogether arranged in a V-like pattern; fourth and fifth ventral segments with pale hair.

Type, male, No. 2396, Mus. Calif. Acad. Sci., collected by M. C. Van Duzee, February 28, 1926, at **Mill Valley, Marin County, California**. A very distinct and beautiful species of this parasitic genus. The spotting of the abdomen reminds one of *B. johnsoni* Ckll., but that has only six spots and the hair of the thorax above is lively fulvous, without a black patch. They agree in the bulging third cubital cell. *B. maculata* (Vier.) is a much smaller species with four spots on abdomen and hair of clypeus and mesopleura black.

ADDITIONS TO THE LIST OF ALASKAN
COLEOPTERA TAKEN IN THE
SUMMER OF 1924

BY H. C. FALL
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STENUS

In the list of Coleoptera taken by the writer in and adjacent to Alaska during a trip made in the summer of 1924¹ six species of *Stenus* were given, viz., *bipunctatus*, *austini*, *pterobranchys*, *stygius*, *mammops* and *cariniceps*, and ten others were reported as unidentified. Since then I have been able to compare these with the types in the Casey collection and give below the results of this study. Types of the new species are in the author's collection.

STENUS SHOSHONIS Csy.

A single male taken at Ketchikan, August 1, 1924, is thus referred. The unique type in the Casey collection is a female and somewhat more robust than my male, and the elytra are slightly more coarsely sculptured, but the identification I believe is fairly reliable.

STENUS INSULARIS Csy.

Scow Bay, July 30, 1924, two females. *Stenus vexatus* Csy. is a synonym of this, but for some reason the synonymy is reversed in the Leng list.

Stenus frigidus Fall, n. sp.

Form only moderately robust in the male, the female distinctly stouter; black, feebly shining, femora dark rufo-fusca above, a little paler beneath; pubescence very short and fine, scarcely visible except on the abdomen. Head as wide as the elytra at base, densely evenly punctate, interocular convexity rather strong, as wide as the adjoining surfaces anteriorly. Antennæ black, proportioned as in *vespertinus*. Prothorax narrower than the head, one-fourth longer than wide (♂), or somewhat stouter (♀); widest just in advance of the middle, sides just perceptibly sinuate posteriorly; base and apex subequal; closely, nearly uniformly and rather coarsely punctate; canaliculation occupying about the middle half of the length, moderately deep and distinct posteriorly, becoming shallower in front. Elytra a little wider than long, suture just perceptibly longer than

¹ Pan-Pacific Entomologist, Vol. II, pages 127 and 191, 1926.

the pronotum, sides feebly divergent posteriorly; moderately coarsely and closely punctate, the punctures more or less coalescent into short channels posteriorly and with a fairly well defined vortex just behind the middle and toward the sides, elsewhere distinctly separated, except basally along the suture and in the introhumeral depressions; abdominal segments gradually diminishing in width, finely, not densely punctate, transverse carinae tricuspid.

Male. Ventral segments flattened beneath, fourth to sixth distinctly broadly roundedly impressed, the margins of the impression on the fourth and fifth segments fringed with long suberect hairs; fifth segment distinctly rather strongly arcuately emarginate, the sixth with a subparabolic emargination nearly as deep as wide; seventh segment broadly emarginate at tip, with short acute limiting teeth.

Female. Sixth ventral segment evenly rounded behind. Length, 3.5 mm.

Described from four examples (2 ♂, 2 ♀) collected at Fairbanks, Alaska, July 7, 1924. An Edmonton, Alb., male in my collection is quite surely identical, and a female from Mile 214, H. B. Territory, is provisionally associated though with poorly defined elytral vortex.

This species, by Casey's table, must be placed next to *sectator*, with which it agrees in size and form. In *sectator* the elytra are, however, much more intricately rugose, and the ventral segments in the male, though similarly emarginate and impressed, show scarcely a trace of the long setae so conspicuous in *frigidus*. Should the elytral vortex be disregarded and the species be looked for in the following section, it would be by the table run to *vespertinus* and *convictor*. The former differs from the present species by its much larger and longer elytra and denser abdominal punctuation, while *convictor* has the elytra more densely and confusedly punctate, and much simpler abdominal sexual characters of the male. Five specimens of *vespertinus* were taken by me on this trip, at Victoria, British Columbia, unfortunately all females, as is the unique type.

STENUS CORVUS Csy.

Wrangel, June 17, 1924; Skagway, June 18; Fort Yukon, July 2; Juneau, July 26; Dawson, Y. T., June 26 to 30.

This is a common and widely dispersed species throughout the Northwest. The apical margin of the sixth ventral is distinctly emarginate in the male, whereas Casey describes it as

truncate. In his single male type the apical margin of the sixth ventral is irregularly worn or broken so that its precise form is not determinable with certainty, and I have reason to believe that his supposed male is in reality a female. Moreover, it is difficult to believe that the sixth segment can be truncate on *a priori* grounds, inasmuch as there is no known species of the *corvus* type in which that is true, all species of which males are known having this segment distinctly emarginate in greater or less degree, while in the entire genus only some three or four small species, none at all allied to *corvus*, have the sixth segment truncate.

STENUS ALPICOLA Fauv.

Skagway, June 18, 1924; Eagle, July 1; Seward, July 20.

STENUS NANULUS Csy.

Fairbanks, July 7; Anchorage, July 13.

STENUS VENUSTUS Csy.

Scow Bay, July 30, a single female. The unique type in the Casey collection bears only Schwarz' No. 558, and I was not able to ascertain its locality. My specimen matches the type very well except as to sex, the type being a male.

STENUS EGENUS Er.

Skagway, June 18, five examples; Yukon River (Arctic Circle), July 2, one female.

STENUS VINNULUS Csy.

Fairbanks, July 7; Dawson, Y. T., June 24.

Stenus exploratus Fall, n. sp.

Slender, entirely black except the extreme base of the palpi; pubescence extremely short and inconspicuous on the head and prothorax, longer, cinereous, appressed and moderately distinct on the elytra and abdomen; interspaces between the punctures excessively minutely and scarcely visibly alutaceous, feebly shining. Head small, evidently wider than the thorax, but scarcely as wide as the base of the elytra; interocular convexity well developed, broadly convex, wider than the adjacent distance to the eyes, punctures rather fine and well separated. Prothorax nearly one-fourth longer than wide, widest at the middle, before which point the sides are moderately convergent and just perceptibly arcuate, behind strongly sinuate to base, which is a little narrower than the apex; surface convex, not at all canaliculate, punctures fine though slightly larger than on the head, sep-

arated by their own diameters or less and quite evenly distributed. Elytra very slightly longer than wide, sides only feebly divergent, suture nearly one-third longer than the pronotum; surface somewhat depressed, punctuation similar to that of the prothorax, the punctures all isolated and distinct. Basal segments of the abdomen nearly as wide as the contiguous elytra, side margins strong on first four segments, much narrower on the last two, finely, evenly, not densely punctate; transverse carinæ not distinctly cuspid.

Male. Unknown.

Female. Sixth ventral broadly angulate at apex.

Length, 3 to 3.2 mm.

Described from two female specimens taken in Mount McKinley Park, Alaska, July 9, 1924.

Considering the abdominal carinæ as not cuspid, this species runs to *luculentus* in Casey's table. In that species, however, the interocular surface is said to be equally trilobed by the sulcations, the intermediate part nearly flat, elytra at base slightly narrower than the head, legs somewhat paler beneath, last ventral of female broadly rounded. If the abdominal carinæ are regarded as rudimentarily four-cuspid the present species would be associated with *argus* (*agens* and *rigidus* Csy.), which differs by the larger head, nearly flat interocular surface, much coarser punctuation, and more convex elytra.

EUÆSTHETUS

Euæsthetus pacificus Fall, n. sp.

Form slender, linear, rufopiceous; legs and antennæ paler, abdomen blackish; pubescence very fine, short and obscure; head, thorax and elytra polished, the last finely and evenly punctate, the two former a little more strongly and coarsely so; the punctures on all separated by about their own diameters on the average; abdomen minutely alutaceous and dull, the punctures sparse and fine. Head, including the eyes, as wide as the prothorax; the latter just perceptibly wider than long; sides parallel and just visibly arcuate in more than apical half, thence strongly convergent and sinuate to base; posterior discal erosions well marked and rather long. Elytra strongly transverse, sides moderately divergent, suture not more than three-fourths as long as the pronotum; color, luster and punctuation uniform. Sixth ventral of male with an acutely triangular emargination which is fully as deep as wide. Sixth ventral of female rounded at apex.

Length, 1.5 mm.

Described from one male and five females taken in damp moss at Scow Bay, Alaska, July 30, 1924.

In the single male specimen, which is taken as the type, the abdominal margin is moderately strong on the first three segments, but almost wanting on the fourth and fifth; in the females the fourth segment is about as widely margined as the three preceding, the fifth more narrowly so.

This is not only the first species of *Euæsthetus* to be found in Alaska, but it marks the first occurrence of the genus on the Pacific Coast. By the very short elytra it must be associated with *brevipennis* and *punctatus*, differing from the former in its larger size, different color and more slender form, and from *punctatus* in numerous details, judging from the description of the latter, which being described from Florida can hardly by any chance be identical.

NOTES

Listronotus obliquus Fab.—This dirt-colored weevil, some 7 to 8.5 mm. in length, which is now called the tomato weevil and is a native of South America, was first reported from our southern states in 1923,¹ and in March and April, 1925, reported as attacking carrots in the neighborhood of Santa Clara and San Jose, California, by Mr. T. D. Urbahns. A number of specimens were also captured during 1925 on the university campus at Berkeley by Mr. F. C. Hadden and myself, which would seem to indicate that this injurious species is now somewhat widely distributed in California.—Edwin C. Van Dyke.

Dyslobus (Amnesia) granicollis (Lec.).—This rather common native weevil of the Northwest was bred from the roots of the cultivated strawberry at Woodburn, Oregon, October 10, 1926, by Mr. J. Wilcox of the Oregon Agricultural College. It is the first time that any member of this widely distributed Pacific Coast genus has been reported as developing in any of our cultivated plants. The adults of a number of species have, however, often been found to be injurious to foliage.—Edwin C. Van Dyke.

¹ Chittenden, F. H. The Australian tomato weevil introduced in the South. U. S. Dept. Agr. Circular 282, July, 1923.

Harned, R. W. A new potato weevil in Mississippi. Quarterly Bul. State Plant Board of Miss., Vol. 2, No. 4, p. 12, 1923.

Chittenden, F. H. An introduced beetle related to the tomato weevil. Proc. Biol. Soc., Wash., Vol. 33, pp. 71-74, Pl. I (July 30, 1926).

GENERIC SYNONYMY (LEPID., PHALÆNIDÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN

Decatur, Illinois

TRICHOCOSMIA Grt.

Type *Trichocosmia inornata* Grt.1883, Grote, Can. Ent., XV, 6, *inornata* sole species and therefore type.1895, Grote, Abh. Nat. Ver. Bremen, XIV, 92, type designated *inornata*.1910, Hampson, Cat. Lep. Phal. B. M., IX, 153, type designated *inornata*.

1921, Barnes and Lindsey, Psyche, XXVIII, 159, subfamily Mominæ.

NAMANGANA Staud.

Type *Namangana cretacea* Staud.1888, Staudinger, Stett. Ent. Zeit., p. 28, *cretacea* sole species and therefore type.1909, Hampson, Cat. Lep. Phal. B. M., VIII, 544, type designated *cretacea*.¹

PARAMIANA B. and Benj.

Type *Hadena lætabilis* Sm.1924, Barnes and Benjamin, Contrib., V, (3), 154, type designated *lætabilis*.

AMIANA Dyar

Type *Amiana niama* Dyar1904, Dyar, Proc. Ent. Soc. Wash., VI, 104, *niama* sole species and designated type.1924, Barnes and Benjamin, Contrib., V, (3), 154, type designated *niama*.

We have, 1924, called attention to the fact that *niama* Dyar is an Erastriid and erected the genus *Paramiana* to hold *lætabilis* and a few other species.

Hampson's drawing of *cretacea* Staud., type of *Namangana*, showed such a different habitus from North American species of "Acronyctinæ" (Apatelinæ), and appeared so similar to some Hadeninæ that we were suspicious, and wrote our good

¹ We have already called attention to the fact that *Eupolia* Sm., type *licentiosa* Sm., sunk to *Namagana* by Hampson, has hairy eyes; *licentiosa* being a synonym of *dentatella* Grt., type of *Trichopolia* Grt., *Eupolia* falls before *Trichopolia*: (see 1923, Bull. B'klyn Ent. Soc., XVIII, 123).

friend Professor M. Draudt to see if he could obtain a specimen for us. The Palearctic species placed in *Namangana* are rare, but Professor Draudt, through the courtesy of Doctor Bang-Haas, was able to loan us cotypes of *cretacea* and *accurata* from the Staudinger collection.

We find that both of these species have hairy eyes and would fall between *Nephelistis* and *Odontestra* in Hampson's keys (1905, Cat. Lep. Phal. B. M., V, 5). The genus *Namangana* is, in reality, very close to *Scotogramma*, but with the habitus of a lightly built *Trichoclea*.² We have been unable to find dorsal tuftings on the abdomen of any species of the *submarina* (genotype) group of *Scotogramma* except the tuft on the basal segment, but our specimens are all slightly rubbed and fresh material may furnish a tufting character to differentiate *Scotogramma* and *Namangana*. Temporarily the more hairy eyes, presence of some lashes from behind the eyes, heavier build, and, in the typical group, the more hairy vestiture of the thorax will serve to separate *Scotogramma* from *Namangana*. The hair on the eyes of the Palearctic *Namangana* species is difficult to see, being much the same as in "*Polia*" *alfkenii* Grt., a species originally described as a *Perigea* (naked eyes) and subsequently twice redescribed by Smith, once as having naked eyes (*Perigea latens*) and subsequently as possessing hairy eyes (*Tæniocampa occlunia*).³

Trichocosmia Grt. was described as possessing hairy eyes. Grote, 1895, placed the genus next to *Trichoclea*. Hampson, 1910, overlooked the hair on the eyes and placed the genus in the "Acronyctinæ" (Apatelinæ). Barnes and Lindsey, 1921, saw the hair on the eyes and placed the genus in the "Mominæ." The genus is extremely close to *Namangana* and belongs in the Hadeninæ. The eyes are hairy, the hair sparse, fine, and rather difficult to see. Vein 5 of the hind wing is scarcely more than a fold, and rather strongly bent at the base for a

² The name *Barathra* Hbn. should probably be used instead of *Trichoclea* Grt. In place of *Barathra* of authors, *Mamestra* Ochs., type *brassicæ* L., designated by Duponchel, 1829, Lep. Fr., VII, (2), 71, can be used.

³ The hair on the eyes also overlooked by Hampson, l. c., p. 546, the species being listed as section 2 of *Namangana*. While *alfkenii* agrees with *cretacea* in that the eyes are less hairy than normal for the subfamily Hadeninæ, the pectinate male antennæ, lashes from behind the eyes, the relatively smooth frons, and the obsolescent clypeal plate prohibit its placement in the same genus as *cretacea*.

member of the Hadeninæ, this latter character presumably the reason for prior placement in the "Mominæ." But the obsolescent nature of vein 5 of the hind wing prohibits placement in the "Mominæ" (Pantheinæ). The Pantheinæ are typical quadrifids with strong and tubular vein 5, of a Bombycid habitus, and with a smooth frons.⁴

Namangana and *Trichocosmia* differ in their genotypes by the following characters:

Namangana; clypeal plate strongly produced, vein 5 of hind wing rather close to 4, for a member of the Hadeninæ, nearly parallel with it, and not bent at base.

Trichocosmia; clypeal plate rather weak but present; vein 5 of hind wing scarcely more than a fold and strongly bent at base for a member of the Hadeninæ. We suggest following Grote, 1895, and placing the genus after *Trichoclea*.

For the North American species now placed in *Namangana* we erect the following genus:

Draudtia B. and Benj., gen. nov.

Type *Namangana revellata* B. and Benj.

Eyes naked. Tibiæ unarmed. Proboscis fully developed. Palpi upturned, the second joint reaching to about the middle of the frons and moderately scaled in front, the third joint moderate and porrect. Frons very slightly roughened and without prominence. Eyes large, rounded. Antennæ of male typically ciliated, beaded, sometimes serrate.⁵ Head and thorax clothed chiefly with scales, the pro- and metathorax with spreading crests. Abdomen with dorsal crest at base only. Fore wing; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing; veins 3, 4 from angle of cell; 5 obsolescent from about one-third below middle of discocellulars; 6, 7 typically from upper angle; 8 anastomosing with the cell near base only.

⁴ The North American species of *Raphia* fall into the Pantheinæ. The type of *Raphia* Hbn. is *Noctua hybris* Hbn., designated by Grote, 1874, Bull. Buff. Soc. Nat. Sci., II, 6. The hair on the eyes of our North American forms is difficult to see, as the individual hairs are very short. They can, however, be seen with a high-powered binocular microscope. We have, so far, been unable to examine the genotype of *Raphia* to see if it possesses hairy eyes. If *hybris* and *frater* are congeneric, *Certila* Wlk., type *fluxuosa* Wlk. and *Saligena* Wlk., type *personata* Wlk., will be synonyms of *Raphia*.

⁵ Hampson places "*Xanthoptera*" *pectinicornis* Hamp., an Indian species with strongly bipectinate male antennæ, in *Namangana*; but he also places in *Namangana*, *licentiosa* Sm. and *alfkenii* Grt., the only other species of his *Namangana* supposed to have pectinate antennæ. We have shown that both of these latter belong in the Hadeninæ, and suspect that *pectinicornis* will not be congeneric with *revellata*.

A number of different groups are represented within the genus, and it is probable that some of these will ultimately obtain generic names.

Cea Grt.

Type *Cea immacula* Grt.

1883, Grote, Pap. III, 78, *immacula* sole species and therefore type.
1895, Grote, Abh. Nat. Ver. Bremen, XIV, 93, type designated
immaculata!

1910, Hampson, Cat. Lep. Phal. B. M., IX, 280, type designated
immacula.

Proboscis present, functional, rather weak; palpi short, the second joint somewhat upcurved and with little hair, the third joint porrect; frons with a strong corneous prominence, somewhat variable individually, in general somewhat heart-shaped with the point of the heart toward the vertex of the head, with an additional corneous central papilla; clypeal plate rather large; eyes moderate, rounded, unlashd, hairy, the hairs rather sparse and not easily seen; antennæ of male ciliated; thorax clothed with scales mixed with a few hairs and hair-like scales, appearing uncrested, the prothoracic crest practically obsolete, the metathoracic crest obsolescent; tibiæ moderately fringed with hair, unarmed; tarsi normally spined; abdomen with neither crests nor hair tuftings, the basal hairs scattered. Fore wing with the apex rounded, the termen evenly curved and not crenulate; veins 3 and 5 from near angle of cell; 6 from slightly below upper angle; 9 from 10, anastomosing with 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from near angle of cell; 5 obsolescent from somewhat below middle of discocellulars and rather strongly bent basally for a trifid; 6, 7 from upper angle, sometimes connate, often stalked; 8 anastomosing with cell near base only.

The genus belongs in the Hadeninæ. Hampson, 1910, did not have a specimen of *immacula* before him, and drew his generic description from *cirphidia* and *leucanidia*. Consequently his description is considerably in error.

By Hampson's key to the Hadeninæ, 1905, Cat. Lep. Phal. B. M., V, 5, *Cea* would key to "*Meliana*."⁶ McDunnough, 1916, Ent. News, XXVII, 396, has already shown that *Meliana* Curtis is a *nom. nov.* for *Melia* Curtis nec Bilb., with *sociella*, a Galleriid Pyralid, as type, and suggests the use of *Neleucania* Sm. for the genus.

⁶ The difference between a "rounded prominence" and a "truncate conical prominence" in Hampson's key to the Hadeninæ is evanescent. If *Cea* is keyed as having a "truncate conical prominence" it falls entirely outside the key because of lack of abdominal tuftings.

Neleucania, however, is a member of the *Heliophila* (or *Leucania*) group of genera. Its comparatively smooth frons is merely somewhat rounded out.

Cea belongs close to *Trichocosmia* and we would place it just before the latter.

OMMATOSTOLA Grt.

Type *Ommatostola lintneri* Grt.

1873, Grote, Bull. Buff. Soc. Nat. Sci., I, 112, *lintneri* sole species and therefore type.

1910, Hampson, Cat. Lep. Phal. B. M., IX, 339, type designated *lintneri*.

Proboscis fully developed; palpi obliquely upturned, the second joint not reaching the middle of the frons, the third joint porrect; frons somewhat roughened but not greatly rounded out; eyes large, round, ciliated from behind only, hairy, the hair obsolescent and difficult to see; antennæ of male beaded and ciliated; thorax clothed with hair intermixed with flattened hair and a few narrow bifurcate scales, crests obsolescent, practically obsolete; tibiæ fringed with hair; first abdominal segment with some hair dorso-laterally, abdomen otherwise rather smoothly scaled and without crests. Fore wing with the apex rounded, the termen obliquely curved and not crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 from 10 anastomosing with the stalk of 7 and 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 obsolescent from about one-third below middle of discocellulars; 6 and 7 from upper angle, variable individually, either connate or stalked; 8 anastomosing with cell near base only.

Hampson, 1910, has made a number of errors in the generic description. The genus belongs in the Hadeninæ, and is close to *Faronta* Sm. (type *aleada* Sm.), but differs in the more normal wing shape, somewhat longer palpi, possession of rough hair on the basal abdominal segment, the thoracic vestiture without broad scales, and the obsolescent nature of the hair on the eyes.

Buchholzia B. and Benj., gen. nov.⁷

Type *Arsilonche colorada* Sm.

Proboscis fully developed; palpi upturned, the second joint reaching the frons and moderately fringed with hair, the third joint

⁷ Named in honor of our good friend Mr. Otto Buchholz. Messrs. Buchholz and Lemmer have, in a most unselfish manner and with no thought of any personal gain whatsoever, donated to the Barnes collection large quantities of valuable material and have thereby greatly assisted us.

porrect; vertex with a strong band of hair-like scales between and ventrad of the antennal sockets; frons with a rounded roughened prominence covered with scales, the central scales usually lost due to rubbing, the clypeal plate small; eyes large, round, ciliated from behind, hairy, the hair obsolescent and difficult to see; antennæ of male ciliated; thorax clothed with hair and hair-like scales, the pro- and metathorax with small spreading crests; tibiæ unarmed, moderately fringed with hair; abdomen with some rough hair at the base, especially laterally, dorsally tending to form an obsolescent crest on the first segment. Fore wing with the apex somewhat produced and acute, the termen evenly curved and hardly crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; radial veins variable individually, 9 from 10 anastomosing with 8 to form the areole, or 9 from 10 anastomosing with the stalk of 7 and 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 obsolescent from about one-third below middle of discocellulars; 6 and 7 shortly stalked from upper angle (in all available material, probably a character subject to individual variation); 8 anastomosing with the cell near base only.

This is in reality the genus *Cea* of Hampson, but not of Grote. The genus belongs in the Hadeninæ, and is close to *Faronta* Sm. The obsolescent nature of the hair on the eyes will immediately separate this genus from its allies in the *Neleucania-Faronta* group except from the genus *Ommatostola*. In wing-shape and hair on the eyes it resembles the latter. *Buchholzia* has the frons heavily rounded out and clothed with closely appressed scales; *Ommatostola* has the frons much less rounded out, smoother, and covered with a dense vestiture of hair, hair-like scales, and scales.

Lemmeria B. and Benj., nom. nov.⁸

Type *Anchocelis digitalis* Grt.

‡ *Brachycosmia* Hamps. (nec. Butler)

Type *Anchocelis digitalis* Grt.

1906, Hampson, Cat. Lep. Phal. B. M., VI, 496, *digitalis* sole species and designated type.

Proboscis aborted, small. Palpi obliquely upcurved, and fringed with long hair in front. Frons strongly produced into a crescent-shaped prominence the ventral edge of which is defined by a strong ridge, clypeal plate not visible. Eyes small, reniform, strongly lashed, naked. Antennæ of male beaded and ciliated. Head and thorax clothed with hair and hair-like bifurcate scales, the prothorax with more or less of a triangular crest, probably movable, differing

⁸ Named in honor of our good friend Mr. Frederick Lemmer.

individually (metathorax too rubbed in six examples before the authors to tell the exact nature of its vestiture). Tibiæ fringed with long hair and unarmed. Tarsi rather heavily spined. Abdomen clothed with long hair as well as scales and with a dorsal tuft of hair on the first segment; elongate in female, normal in male. Fore wing; triangular, the costa nearly straight, the apex somewhat produced, the termen obliquely curved; veins 3, 5 from near angle of cell; 6 from below upper angle, 9 from 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing with veins 3, 4 from angle of cell or shortly stalked; 5 little more than a fold, from slightly below middle of discocellulars, nearly parallel with 4, not bent basally; 6, 7 shortly stalked; 8 anastomosing with the cell near base only.

We have redescribed the genus because of the number of errors in Hampson's description. The name *Brachycosmia* is preoccupied by *Brachycosmia* Butler (1890, Trans. Ent. Soc., Lond., p. 680). *Noctua ambusta* D. and S. sole species and designated type. *Brachycosmia* Butl. falls to the genus Hampson (1. c., p. 493) calls *Atethmia* Hbn., and credits to the Verz. bek. Schmett., but *Atethmia* Hbn. was first published in the Zuträge as a monotypic genus with type *subusta* Hbn., so that *Atethmia* Hbn. should be used instead of *Bagisara* Wlk. in the Apatelinæ. *Tethea* Ochs., which Hampson lists "non descr. nec *Tethia*, Lam. Pisc. 1816, or *Tethya*, Oken, Spong. 1815 . . . type . . . *ambusta*," is presumably an available name, as it does not appear to be a homonym and Ochsenheimer described it by indication, viz., bibliographical references. The type of *Tethea* Ochs. appears to be *or* Fabr., designated by Curtis, 1829, a species belonging to the Thyatiridæ, not to the Phalænidæ, with no North American species now listed as congeneric. *Cirrædia* Gn., 1852, Sp. Gén., V, Noct., I, 401, p. 402, type designated *xerampelina*, is the oldest generic name we find available for *Atethmia* of Hampson and authors. *Brachycosmia* Butl. appears to be a synonym of *Cirrædia* Gn. *Eucirrædia* Grt. is based on the more crenulate outer margin of the fore wing of its genotype, *pampina*, a difference which, at this time, we do not consider of generic significance; and follow Hampson in listing it as a synonym of *Cirrædia*.

PLATYPOLIA Grt.

Type *Pachypolia acutissima* Grt.

1895, Grote, Abh. Nat. Ver. Bremen, XIV, 82, type designated *acutissima*.

Eurotype Hamp.

Type *Pachypolia acutissima* Grt.

1906, Hampson, Cat. Lep. Phal. B. M., VI, 289, type designated *acutissima*.

The name *Platypolia* Grt. appears to have been generally overlooked in the literature. *Eurotype* Hamp. is a straight synonym.

HELIODORA Neum.

Type *Heliodora magnifica* Neum.

1881, Neumoegen, Can. Ent., XXIII, 125, *magnifica* sole species and therefore type.

1895, Grote, Ent. Rec., VI, 79, preoc.

1895, Grote, Abh. Nat. Ver. Bremen, XIV, 108, preoc.

1910, Hampson, Cat. Lep. Phal. B. M., X, 675, lists preoc., *Heliodore*, Stål, Hem., 1867; type designated *costalis*, presumably for synonym *magnifica*.

Græperia Grt.

Type *Heliodora magnifica* Neum.

1895, Grote, Ent. Rec., VI, 79, nom. nov. for *Heliodora* Neum. nec *Heliodore* Stål, type designated *magnifica*.

1895, Grote, Abh. Nat. Ver. Bremen, XIV, 108, type designated *magnifica*.

1910, Hampson, Cat. Lep. Phal. B. M., X, 675, type designated *costalis*, presumably for synonym *magnifica*.

Tornacontia Sm.

Type *Tarache sutrix* Grt.

1900, Smith, Trans. Am. Ent. Soc., XXVII, 49, lists *sutrix* and *megocula*.

1910, Hampson, Cat. Lep. Phal. B. M., X, 675, type designated *sutrix*.

Heliodora Neum. does not appear to be a homonym, and the name should be used instead of *Græperia* Grt. *Tornacontia* Sm. may ultimately be valid generically, as its genotype, *sutrix*, differs considerably from *magnifica*.

THERASEA Grt.

Type *Tarache angustipennis* Grt.

1895, Grote, Abh. Nat. Ver. Bremen, XIV, 115, footnote, *angustipennis* sole species and designated type; p. 126, name in index without page reference.

1903, Dyar, List, p. 213.

1903, Holland, Moth Book, p. 251.

1910, Hampson, Cat. Lep. Phal. B. M., X, 702, lists non. descr., quoting p. 126 of Grote, 1895; lists preoc., *Therasia* Hutton, Moll., 1884; type designated *angustipennis*.

Conacontia Sm.

Type *Conacontia flavicosta* Sm.

1900, Smith, Trans. Am. Ent. Soc., XXVII, 49, 55, 57, 58, lists *angustipennis* and *flavicosta*.

1910, Hampson, Cat. Lep. Phal. B. M., X, 702, type designated *flavicosta*.

Therasia Grt. does not appear to be a homonym. Grote, 1895, sufficiently described the genus to render the name available. The name should be used instead of *Conacontia* Sm.

PARACRETONIA Dyar

Type *Paracretonia xithon* Dyar

1912, Dyar, Proc. Ent. Soc. Wash., XIV, 167, *xithon* sole species and therefore type.

Proboscis fully developed; palpi obliquely upturned, rather short, the second joint reaching the clypeal plate, the third moderate and reaching about the center of the frons; frons with a corneous prominence, irregular in outline, rather truncate, armed with strong, pointed granulations arranged to cover the cephalic surface of the prominence and also in a ring around its outer margin, a strong clypeal plate present; eyes large and rounded, naked, unciliated; antennæ of male (?); thorax clothed almost entirely with scales, only a slight metathoracic crest visible in specimens before the authors; tibiæ moderately fringed with hair, unarmed, the fore tibiæ somewhat shorter than normal; fore metatarsus armed with five long curved spines on outer side, otherwise the tarsal armature nearly normal; abdomen with a very slight dorsal crest on the basal segment only. Fore wing with the apex rounded, the termen slightly crenulate, otherwise evenly curved; veins 3, 5 from near angle of cell; 6 from slightly below upper angle; 9 from 10, anastomosing with 8 and 7 to form the areole (7, 8, and 9 stalked from areole) which is small; 11 from cell. Hind wing with veins 3, 4 from angle of cell; 5 strongly developed from close to the angle; 6, 7 from upper angle appearing very slightly stalked; 8 anastomosing with cell near base only.

As Doctor Dyar's original description is rather brief, we have redescribed the genus. Taxonomically the genus is very interesting. We have no knowledge of the duplication of its

peculiar frons. The hind wing venation is typical quadrifid rather than the intermediate type common to most of the "Erastrinae" (recte Acontinae). The tarsal armature combined with the very strong clypeal plate and general habitus recalls the Heliothids; while other habitus characters are reminiscent of that group of Apatelinae surrounding *Oxycnemis*. This, and the following new genus, have many characters in common. Tentatively we place them in the "Erastrinae." *Erastria* is a Tentamen genus, simply stolen by Ochsenheimer after his acknowledged receipt and adoption of the work, from the Geometridae. Besides its use in the Tentamen, there is a decided possibility that *Erastria* was elsewhere published by Hubner in the Geometridae before being published by Ochsenheimer in the Phalaenidae. The type genus of Acontinae is *Acontia* Ochs., with type *solaris* D. and S. designated by Duponchel, 1829. Hampson has already rejected Acontinae as employed in the Cat. Lep. Phal. B. M., adopting in its place "Westermannianae," derived from *Westermannia*. If this latter is the type genus of the subfamily, which we much doubt, the name would have to be Westermanninae to comply with the International Zoological Code.

Airamia B. and Benj., gen. nov.⁹

Type *Hoplotarache albiocula* B. and McD.

Proboscis very long; palpi obliquely upturned, rather short, the second joint reaching the clypeal plate, the third short, semi-porrect, reaching about the center of the frons; frons strongly rounded out, with a truncate corneous prominence with raised rim, the prominence nearly circular in outline, the circle ventrally flattened, with an additional very strong circular truncate corneous process from the ventral edge of the prominence, a strong clypeal plate present; eyes large and rounded, naked, unciliated; antennae of male simple, clothed with very short cilia only; thorax clothed almost entirely with scales, prothoracic crest obsolescent, practically obsolete, metathoracic crest strong; tibiae moderately fringed with hair, unarmed, the fore tibiae scarcely shorter than normal; fore metatarsus armed on outer side with a long curved claw nearly the length of the second tarsal joint, and three spines the distal two of which are stronger than normal; other tarsal spines, especially those on the distal part of their respective segments, tending to be longer than normal; abdomen practically

⁹ Stem of name, an anogram, being in recognition of the efforts of the wife of the junior author to assist with catalogue work, and in other ways.

uncrested, a few scales on the basal segment tending to be arranged as an obsolescent dorsal crest. Venation as in *Paracretonia* with the exception that the areole is considerably larger.

A. albiocula is, as yet, very rare in collections. The Barnes collection possesses the female type from Olancha, Inyo County, California, figured 1918, Contrib., pl. XVII, 12. To the best of our knowledge this remained a unique until a short time ago, when Mr. Van Duzee sent other specimens taken by Mr. J. O. Martin in Silver Canyon, White Mountains, Inyo County, California. We are greatly indebted to Mr. Van Duzee for a pair of this interesting species. We understand that a couple of other specimens are in the collection of the California Academy of Sciences, these including a specimen compared with the type.

A NEW SUBSPECIES OF EUPARTHENOS NUBILIS (LEPID., PHALÆNIDÆ, CATOCALINÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN

Decatur, Illinois

Euparthenos nubilis osiris Barnes and Benjamin race nov.

Similar to *E. nubilis apache* Poling, but much paler. The orange of the upper side of the hind wing replaced by luteous. Beneath also much paler and with the normal orange tones largely replaced by pale luteous.

Type locality: Jemez Springs, New Mexico.

Number and sexes of types: Holotype ♂, 24-31 July; allotype ♀, 16-23 July.

Notes—Types in Barnes collection, which also possesses a similar pair taken by Mr. Oslar at Rio Blanco Mountain, Colorado, July.

R EUPHYDRYAS QUINO BEHR

BY JAMES E. COTTLE
San Francisco, California

There has been the most interminable confusion in regard to the identity of this species. In 1907 Fordyce Grinnel in a paper in the Canadian Entomologist, page 380, confuses *quino* with *augusta* Edw. Barnes and McDonough in their contributions do not altogether acquiesce. However, Grinnel's Synonymy is accepted for the time being.

W. G. Wright, in his book "Butterflies of the West Coast," page 147, makes the following statement: "Before Doctor Behr's death, I applied three times to see *quino*, without success, so I concluded he had no *quino* examples."

Let me here state that Doctor Behr was a very peculiar man. If you understood him, you might sail along like a ship before the wind, in the most amiable manner. On the contrary, if you entered the Academy in that know-it-all, arrogant mode your dove-like voice would not be heard, your desired information or request would go by the board.

G. O. Mueller, an old German friend of mine, with whom I collected many years, once said to me: "Cottle, what is the matter with Behr? If I am in your company I can see something" (referring to certain specimens he wished to see), "but if I am alone he will show me nothing." My answer was: "Mueller, you presume too much; do not cross him."

With me it was different. I knew but little regarding entomology, and I always asked Behr's advice in any matter pertaining to it. If he advised me as to where I could capture a certain species, I would try and get it, and would remember him on my return.

The question here is, did Behr have examples of *quino*? When Wright requested to see them I am positive he had, for I myself had given them to him. Some thirty-five years ago I spent a day collecting in Contra Costa County. On this occasion I noticed quite a number of what I considered *chalcedona*. It was their unusual large size that attracted my attention. I captured some twenty specimens. On my way home I dropped into the Academy, as was my custom, and showed my catch

to Behr. He examined one; then rubbing his hands together in apparent glee exclaimed, "My big *quino*, you have some for me, I know." I gave him four pairs. So I conclude that Wright must have displeased or angered him in some manner, since he refused to let him see those specimens.

Wright, I will admit, made many mistakes in his calculations, two of which stand out prominently above all others. The first is about the picturing of a male *Cercyonis stephensi*, in his book. Such a species never existed. *Stephensi* is but one of the many variable females of *Cercyonis gabbi*. Edw. Dr. John A. Comstock, of the Southwest Museum of Los Angeles, has settled that question for all time.

His second blunder of note was in picturing a male *Melittæ eremita*, as his *eremita* is merely the dark female of *palla* Bdv. His *eremita*, as he states, "might have been hiding in an isolated spot on a mountain in central California." But the same species was not so shy or modest in Shasta County, as I have captured numbers of them years ago along the railroad tracks in Castella.

Nevertheless, his conclusions as regards *quino* are correct, and when he refers his readers to Papilio, 1881, page 52, he is right again, for that description answers well, to wit: "Brown-black on upper side, black abounds and overshadows both white and red, and all marking of the underside broadly and conspicuously edged in black." You may call it *chalcedona*, and I am of the opinion you could also call *colon chalcedona* without making much of a mistake. But that is not my contention. I contend that the species I have in my possession is what Behr and Edwards called *quino*, and there is no getting away from the truth. Call it by whatever name you may, I contend, as I said, that it is the true *quino*. And in saying so I but echo the opinion of two of the greatest lepidopterists of their day and my own personal knowledge of the species obtained from my old lamented friend, Dr. Herman Behr.

THREE UNDESCRIBED ERIOPTERINE CRANE-
FLIES FROM CALIFORNIA (TIPULIDÆ,
DIPTERA)

BY CHARLES P. ALEXANDER
Amherst, Massachusetts

Dasymolophilus subnudus Alexander, sp. n.

Male. Length about 2.5 mm.; wing, 3.2 mm.

General coloration of virtually the entire body, including the abdomen and hypopygium, dark brown. Mesonotum dark brown, the scutellum a trifle paler.

Wings longer and narrower than in *ursinus*, the anal region greatly reduced; wings tinged with brown, the veins and macrotrichia darker. Macrotrichia in the cells beyond the cord very sparse, there being none in the distal half, or more, of cells R_3 , R_4 , M_2 or M_4 , and scarcely any in cells R_5 or M_3 ; basad of the cord there is a sparse line of trichia along the centers of the cells, as in *ursinus*. Venation: Cell R_3 more extensively sessile than in *ursinus*, the inner end lying considerably more proximad than either cell R_4 or R_5 ; cell M_3 longer and narrower, widest near midlength; vein *2nd A* relatively short, only about two-fifths the length of vein *1st A*, cell *2nd A* being very narrow. In *ursinus*, vein *2nd A* is longer, approximately one-half the length of vein *1st A*.

Male hypopygium with the dististyle slightly subterminal in position, long, strongly curved to the acute tip, the basal half more swollen; before the tip on the concave face with about three small, acute teeth, shorter and less conspicuous than in *ursinus*, the long narrow apex along the outer convex margin with a series of barely indicated appressed spinulae. Besides the long sinuous aedeagus, there is a more dorsal elongate blackened structure that is densely set along its length with subappressed spinulae.

Holotype, ♂, Berkeley, California, May 7, 1915 (M. C. Van Duzee). Paratopotype, a fragmentary male. Type in the Van Duzee collection.

I am much indebted to Mr. Van Duzee for the loan of this specimen. The genus *Dasymolophilus* Goetghebuer is certainly distinct from *Molophilus*, in several respects pointing more directly to the essentially Australasian genus *Tasiocera* Skuse. Besides the genotype, *murinus* Meigen, of Europe, two species occur in Eastern North America (*ursinus* Osten Sacken and *niphadias* Alexander). Still another perfectly typical species, *circumcinctus* Meunier, is found in the Baltic Amber. It is still

uncertain whether the recently described British species, *pusillus* Edwards, known only from the female sex, belongs to *Dasy-molophilus*, the cells of the wing being glabrous. The species described above departs from the characters of the genus in the subglabrous condition of most of the cells of the wing that lie beyond the cord.

***Molophilus sackenianus* Alexander, sp. n.**

Male. Length about 4.5 mm.; wing about 6 mm.

Antennæ short, pale yellowish brown. General coloration brownish gray, the midline of the præscutum somewhat darker brown; pseudosutural foveæ dark. Halteres pale. Wings with a brownish iridescent tinge, the costal fringe dark brown, the remaining trichiæ of the wing more yellowish, conspicuous. Abdomen dark brown, the hypopygium yellow, the abdomen clothed with long yellow setæ. Male hypopygium unusually large and conspicuous. Basistyles very long and narrow, deeply divided, the dorsal lobe slender, the ventral lobe much longer, expanded at tip and here produced into an acute chitinized spine that is directed dorsad and mesad, the apex of the lobe beyond this spine with a dense erect black pubescence. Basal dististyle a cylindrical black rod that is strongly curved at apex and here provided with microscopic appressed spinulæ. Outer dististyle a little shorter and more slender, sinuous, very gradually narrowed to the acute blackened apex. Ædeagus long and slender.

Holotype, ♂, San Rafael, California, March 31 (Osten Sacken). Type in the Osten Sacken collection, Museum of Comparative Zoology.

This interesting species is named in honor of the great pioneer student of the Tipulidæ, Baron C. R. Osten Sacken. The species is discussed by Osten Sacken (*Western Diptera*, p. 200, 1877), as *forcipula*, to which species it is not closely related. It is certain that Osten Sacken had at least two species of *Molophilus* confused in this material of the "Western Diptera," the only one that is certainly *sackenianus* being the holotype male described. I am indebted to Dr. Nathan Banks for the opportunity of studying this, and other Sackenian types, while on a recent visit to Cambridge.

***Gonomyia (Progonomyia) hesperia* Alexander, sp. n.**

Male. Length, 4.4-4.8 mm.; wing, 4.8-5.5 mm.

Rostrum and palpi dark brown. Antennæ brownish black throughout, the flagellar segments relatively elongate. Head dark gray, the anterior vertex suffused with obscure fulvous.

Pronotum brown with a slightly elevated yellowish median area. Lateral pretergites brighter yellow. Mesonotal præscutum light brown with four darker brown stripes, the narrow intermediate pair confluent in front, narrowly separated behind, not reaching the suture; lateral stripes paler brown, in cases relatively indistinct; lateral margins and humeral region yellowish; pseudosutural foveæ large, shiny dark brown to black; scutum dark brown, the median area broadly testaceous, margined laterally with yellow; posterior lateral angles of scutal lobes yellow; scutellum dark brownish gray, narrowly divided medially by a capillary pale line; postnotum brown, sparsely pruinose, the antero-lateral margins of the mediotergite and the adjacent margin of the pleurotergite restrictedly yellow. Pleura brown, sometimes paler ventrally, with a narrow obscure yellow longitudinal stripe extending from behind the fore coxa, passing above the middle coxa, ending above the posterior coxa. Halteres pale, the knobs dark brown. Legs with the coxæ pale brownish testaceous; trochanters obscure brownish yellow; femora yellowish brown; tibiæ brown, their tips and the tarsi brownish black. Wings subhyaline, the stigma relatively small, elongate-oval to broadly triangular, pale brown; veins dark brown. Venation: Sc_1 ending about opposite two-thirds the length of R_s , Sc alone a little longer than $m-cu$; r preserved but faint, placed at midlength of the stigma and just before fork of R_{2+3} .

Abdominal tergites brown, the sternites somewhat more bicolorous, brighter medially, narrowly darker laterally and subapically, the caudal margin of the intermediate sternites narrowly yellow; hypopygium more yellowish. Male hypopygium with the tips of the basistyles produced beyond the level of the insertion of the dististyles into a conical fleshy lobe with long setæ. Outer dististyle elongate, sinuous, gradually narrowed to the acute black tip, the base expanded, the lower surface of the style with conspicuous setæ. Inner dististyle a straight rod, the basal half stouter, setiferous, on the outer face with a small blackened spine; beyond this spine the apical half of the style is prolonged into a slender rod, the blackened acute apex slightly curved and with a few microscopic setulæ before tip.

Holotype, ♂, Riverside, California, August 24, 1926, at light during a very hot spell (T. D. A. Cockerell). Paratopotype, ♂. Type in the writer's collection.

I am greatly indebted to Professor Cockerell for this and other material that he has most kindly sent me in the past. The only other nearctic species of the subgenus is *slossonæ* Alexander, ranging from South Carolina southward into the neotropical regions. The present species differs from all of the numerous described forms in the unusual degree of hairiness of the dististyles of the hypopygium.

SOME BEES IN THE COLLECTION OF THE
CALIFORNIA ACADEMY OF SCIENCES

BY T. D. A. COCKERELL

Boulder, Colorado

Looking over the undetermined bees at the Academy recently,
I selected the following for study:

OXÆIDÆ

PROTOXÆA GLORIOSA (Fox)

Females: Baboquivari Mountains, Arizona, August 18, 1924
(O. C. Poling).

HYLÆIDÆ

HYLÆUS TRIDENTATUS (Cockerell)

Both sexes; Silver Cañon, White Mountains, Inyo County,
California, May 11, 1926 (J. O. Martin).

HYLÆUS NUNENMACHERI (Bridwell)

Female; Mount St. Helena, California, May 12, 1920 (E. P.
Van Duzee).

PANURGIDÆ

Panurgus melanocephalus Cockerell, n. sp.

Male (type). Length about 9 mm.; rather slender, black, including face; head very broad; hair of head long and abundant but erect, not concealing the surface, mostly black but white on lower part of cheeks and below mandibles; flagellum long and stout, dark red beneath except at base; clypeus dullish, rugulose, with a median longitudinal depression; labrum highly polished; mandibles rufous apically; front entirely dull; cheeks shining; thorax above dullish, mesothorax with a strong median groove; scutellum densely and very finely punctured; area of metathorax dull, not evidently sculptured; mesopleura dull; hair of thorax long and pale, brownish-tinted above; tegulæ shining black; wings faintly dusky, stigma and nervures sepia brown; first recurrent nervure meeting first intercubitus; legs black with pale hairs, tarsi somewhat rufescent apically; abdomen shining, thinly hairy, bases of segments more or less reddish; apex with a tuft of light hairs. Closely related to *P. atriceps* (Cresson), but considerably larger with very broad head, much duller, rugulose clypeus, and shorter mandibles. The dull mesothorax and black tegulæ are also distinctive.

Female. Differs from *P. atriceps* in a similar manner; the dull clypeus, long brownish black hairs on face, dull mesothorax, and darker though somewhat reddish tegulæ. The stigma is dull pale ferruginous, much lighter than in the males. The hair of the thorax above is dilute sooty.

Type No. 2386, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, April 22, 1919, at **Berkeley, California**. Two females are from Muir Woods, Marin County, California, May 4, 1913 (Van Dyke). *P. atriceps* occurs in the coast region from Seattle, Washington (Kincaid), to mountains near Claremont, California (Baker). Fowler records it from Berkeley.

COLLETIDÆ

Colletes kobensis Cockerell, n. sp.

Female. Length about 12 mm., anterior wing 8.3 mm.; rather robust, black with pale ferruginous hair on thorax above and occipital region with no dark hair intermixed; other hairs of head and thorax lighter, white on front of head, cheeks and lower parts of thorax; mandibles black; labrum highly polished, convex, with a median sulcus; malar space linear; clypeus dull, extremely densely and coarsely punctured; face broad; flagellum very obscurely reddish beneath, a little lighter red at tip; mesothorax with very coarse punctures, but on disc shining between the punctures; scutellum shining anteriorly; base of metathorax with a transverse keel, above which are numerous ridges; tegulæ translucent rufotestaceous; wings hyaline, very faintly dusky, stigma and nervures dusky reddish; second cubital cell very broad, receiving recurrent nervure in middle; legs ordinary, with pale hairs, reddish on inner side of tarsi; abdomen moderately shining, closely punctured on first segment, more finely on second, weakly on the others; segments 2 to 4 with rather broad dense white hair bands; first segment with a little band at each extreme side; fifth with a narrow band, its outline convex toward base of segment; apical segment with thin dark rusty-brown hairs. This bee had collected bright ferruginous pollen.

Type, female, No. 2387, Mus. Calif. Acad. Sci., collected October 16, 1909, at **Kobe, Japan**. It has the appearance of *C. succinctus* (L.), but is separated by the first abdominal segment shining and more coarsely punctured and not red on apical margin, the second segment not so finely punctured and the abdominal bands white instead of pale ochreous. Also the basal hair-band on second segment is lacking. Looked at from in front they might well be considered as identical.

The recorded Japanese species of *Colletes* are separated thus:

- Male: 10-11 mm. long; resembles *C. collaris* Dours (*C. cariniger* Pérez), having the sixth ventral segment strongly carinate; hair lively red on vertex, thorax above and first two abdominal segments.....*patellatus* Pérez
- Females (the males unknown)..... 1
1. Abdomen very shining, pyriform; first segment with hind margin ferruginous; wings yellowish.....*perforatus* Smith
- . Abdomen not thus shiny, densely punctured; malar space very short 2
2. Aspect of *fodiens* (Kirby); abdomen with sculpture of first segment somewhat coarse, on second fine, and the rest very fine; hair of thorax above yellowish gray (Yokohama).....*seitzi* Alfken
- . Aspect of *C. succinctus* (L.), but really nearer *C. abeillei* Pérez; sculpture of abdomen extremely fine and dense, transverse, a little stronger and sparser on first segment; tegulæ pale; a small species 10 mm. long. (Tsushima).....*vogti* Pérez

C. kobensis cannot be any of these females though nearest to the smaller *C. vogti*, from which it differs in details of sculpture and color. *C. vogti* has the borders of the abdominal segments pallid, more broadly on the anterior ones. The pale tegulæ and other characters appear to negative the possibility that we have the female of *C. patellatus*. The abdominal bands are entirely different.

ANDRENIDÆ

NOMIA FROGGATTI Cockerell

Male. Length about 11.5 mm.; similar to the female, but differing thus: antennæ long (entirely black); face covered with pale fulvous hair; postscutellum with a pair of long slender spines (the sexual differences here as in the Philippine *N. quadrifasciata* Ashm.); abdomen with five color bands; anterior basitarsi short and broad, heavily clothed with long pale ochreous hair; hind trochanters with a strong obtuse projection; hind femora enormous, exceedingly broad, obtusely conical, about the middle with outstanding red hair; hind tibiæ very thick, trigonal, produced apically, clear red with a large black blotch on basal half; hind tarsi clear red.

Guadalcanar, Solomon Islands (C. H. Froggatt). Presented to the Academy by Dr. E. C. Van Dyke. The species was described in 1911 from two females collected by W. W. Froggatt in the Solomon Islands, the precise locality not specified.

The male is new. It differs at once from *N. pulchribalteata* Cam. by being larger, with bright reddish-orange abdominal bands and the hind femora more swollen.

ANTHOPHORIDÆ

CENTRIS ATRIPES Mocsary

Two miles east of Oracle, Arizona, July 24, 1924 (E. P. Van Duzee).

Anthophora dulcifera Cockerell, n. sp.

Female. Length about 15 mm.; robust, black, the head and thorax above with very bright ferruginous hair, slightly mixed with fuscous; abdomen with four emerald-green bands; face markings light cream color, consisting of transverse supraclypeal marks, produced above, an oblique band on each side bounding clypeus, lower margin of clypeus and a dagger-shaped median band, labrum, except latero-basal spots, and most of basal half of mandibles; flagellum very short, very dark reddish beneath; cheeks with white hair, becoming red above; underside of thorax with white hair; tegulæ dull ferruginous; wings brown; middle tibiæ with white hair, reddish apically on outer side, their basitarsi with black hair, but a tuft of white posteriorly at base; hind tibiæ with black hair in front, pure white behind except a black stripe from base rapidly narrowing to a point; hind basitarsi with entirely black hair, except that the apical brush is very dark chocolate; abdomen with first ventral segment broadly red apically.

Type, female, No. 2388, Mus. Calif. Acad. Sci., collected by J. C. Thompson in 1910 at **Keeling, China**. Superficially this looks like the Australian *A. cingulata* Fabr., the thoracic hair having exactly the same tint though the hair of the legs differs and the eyes are not green. It may possibly prove to be the female of *A. caldwelli* Ckll., from Foochow, China, but the face markings are not as yellow and the thoracic hair is much brighter. In Dover's key (Entomologist, 1924), it runs only to *A. cingulata*. It is, of course, one of the numerous forms segregated from *A. zonata* (L.).

ANTHOPHORA URENS Cockerell

Female. Ishigaki Island, Lu Chu Islands, 1910 (J. C. Thompson). This was described from Formosa. The present specimen differs only by having the outer side of middle basitarsi covered with red hair. The femora are very dark reddish.

A. himalayensis Rad. is allied, but much larger and differing in details of coloration.

***Anthophora tsushimensis* Cockerell, n. sp.**

Male. Length about 13 mm.; robust, black, including antennæ (except scape broadly creamy white in front); legs obscurely reddish; face-marks cream-color, consisting of supraclypeal marks (very broadly angulate above), region between clypeus and eyes, very broad band across lower margin of clypeus, and median stripe (on which clypeus is keeled), mandibles except apex and labrum except the usual basal spots; third antennal joint rather short, not nearly as long as next three together; malar space linear; labrum large; eyes green; hair of head pale yellowish above mixed with black (much black in front), cheeks with white hair; thorax above with light fulvous hair obscurely mixed with brown, beneath with white, tegulæ clear ferruginous; wings stained with brown, especially along the veins; legs with hair mostly pale, but entirely black on the broad (but not toothed) hind basitarsi; spurs of hind legs very large, the hind one exceptionally long and broad at base; middle tarsi long but quite simple and without ornaments, their basitarsi with pale grayish hair on outer side and black on inner; middle tibiæ with white hair on outer side but anteriorly with a tuft of red; hind tibiæ with hair anteriorly white, posteriorly dark brown; abdomen dull, the punctures excessively minute and weak, first two segments posteriorly obscurely reddish; sides of second segment and third more narrowly with appressed pale hair; segments 2 to 6 with white hair bands; apex with black hair and presenting two widely separated teeth.

Type, male, No. 2389, Mus. Calif. Acad. Sci., collected by J. C. Thompson, October 5, 1910, on **Tsu Shima Islands, Japan**. Resembles *A. confusa* Smith, from India, but there is no band on fifth abdominal segment and the abdominal bands are less distinct. The first abdominal segment shows signs of a narrow band laterally, and it was probably more complete when the insect was fresh. There is a superficial resemblance to *A. agama* Rod. which I have from Athens (Morice). This and other specimens reported in this paper had by error been labeled "Tsu Shima, Lu Chu Is.," but the Tsu Shima Islands are in the strait between Korea and Japan and are entirely separated from the Lu Chu or Riu Kiu chain.

***Anthophora (Micranthophora) curta* Prov. *melanops*
Cockerell, n. var.**

Male. Like *A. curta*, but eyes entirely very dark reddish brown instead of green. This is certainly not due to cyanide, the light

yellow markings of clypeus, labrum and mandibles remaining quite normal.

Type, male, No. 2390, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 24, 1924, two miles east of **Oracle, Arizona.**

Melissodes metenua Ckll. **ablusa** Cockerell, n. race

Female. Flagellum very bright ferruginous beneath except at base; hair of thorax variable, sometimes entirely black on mesothorax anteriorly; light hair band on fourth abdominal segment evanescent or feebly developed; hind basitarsi as well as tibiæ with creamy-white hairs.

Type, female, No. 2391, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, September 1, 1912, at **Milbrae, California.** Paratypes seven females, same data. A very striking little insect, but certainly only a slightly modified race of *M. metenua* from Oregon. In build and general appearance there is a resemblance to *Exomalopsis*, but the mouth parts are typical for *Melissodes*, with long paraglossæ and four-jointed maxillary palpi (the first joint large and very short, the next two long and equal, the last very small and slender, less than half the length of third). The bees have collected light orange pollen apparently from a species of *compositæ*.

MEGACHILIDÆ

MEGACHILE DOEDERLEINII Friese

Female. Tsu Shima, October 5, 1910 (J. C. Thompson).

MEGACHILE BICOLOR KAGIANA (Cockerell)

Male. Keelung, China, 1910 (J. C. Thompson). I described *kagiana* from males collected in Formosa and later called the female *M. bicolor taiwana*, not recognizing that it was the same species. Hedicke has recently (1925) referred both to *M. bicolor* (Fabr.), but true Indian *M. bicolor* (the male of which is *M. fletcheri* (Ckll.) has much black hair on the mesopleura in both sexes, and is certainly subspecifically distinct. The Chinese male before me has the hair of face, thoracic dorsum and pleuræ all very bright red; it is more brightly colored than the original *M. kagiana*, but agrees structurally and cannot be separated.

In the same excellent paper Hedicke treats the Formosan

M. takaoënsis Ckll. as a synonym of *M. fervida* Sm. from Hongkong. However, in 1920 I showed that Smith's name was preoccupied, and proposed to substitute *M. perfervida* Ckll. I have seen Smith's type, and had the impression that it was distinct from *M. takaoënsis*, but in view of Hedicke's researches I now think they must be considered the same, at least until new light can be thrown upon the subject. On this basis *M. takaoënsis* will remain the valid name.

MEGACHILE HUMILIS Smith

Female. Tsu Shima, October 5, 1910 (J. C. Thompson). Described from Shanghai.

Megachile remotissima Cockerell, n. sp.

Female. Length about 16.5 mm., width of abdomen about 6.5 mm.; black, very robust, mandibles, antennæ and tarsi black, tegulæ clear ferruginous; wings dilute brownish throughout; stigma dark red, nervures dark fuscous; head about as wide as thorax, facial quadrange longer than broad; mandibles quadridentate, with a broad, cutting edge; clypeus excessively densely, quite strongly punctured, with a straight shining lower edge and a smooth median line; supra-clypeal area punctured but shining, especially the lower part, in abrupt contrast with the clypeus; clypeus with thin dusky reddish hair, sides of face with dense creamy-white hair, front and occiput with fulvous; mesothorax excessively densely punctured, dull anteriorly, shining between the punctures posteriorly; scutellum convex, closely punctured; thorax above with fulvous hair, not mixed with black; on sides and beneath it is pallid, approaching white; legs with mainly pale ochreous hair, bright orange-ferruginous on inner side of tarsi; spurs pale reddish; hind basitarsi very broad and flat; abdomen short and broad, the base with pale ochreous hair, the rest with short black hair and creamy-white hair bands, only those on third, fourth, and fifth segments well developed, on third weak in middle; apical segment slightly concave in profile, with suberect black hair; ventral scopa creamy-white becoming fulvous distally, black on last two segments. The abdomen is wholly without metallic tints.

Type, female, No. 2392, Mus. Calif. Acad. Sci., collected by J. C. Thompson May, 1910, on **Ishigaki Island**, Yaeyama Group, **Lu Chu Islands**. Closely related to *M. remota* Smith from Shanghai, but differs by the absence of violet and green color on the abdomen, and the distinctly greater size, yet it may perhaps be only a race or subspecies of *M. remota*. Strand

described a *M. remota* var. *kagoshimæ* from Kagoshima in southern Japan; I cannot very clearly make out that it is distinct from *M. remota*, and it is not the present form. Ishigaki is at the southern end of the Lu Chu chain, east of Formosa.

HOPLITINA HESPERIA Crawford

Crawford described this (1916) from a female 6.5 mm. long, collected at Redlands, California. A male from Silver Cañon, White Mountains, Inyo County, California, May 11, 1926 (J. O. Martin), has the venation of *H. hesperia* and can only be referred here. It is nearly 6 mm. long; eyes pea-green; face densely covered with pure white hair; flagellum obscurely reddish beneath; wings only slightly brownish; recurrent nervures about equally distant from ends of second cubital cell; first three abdominal segments clear red with a large black median patch; apex of abdomen red, broadly truncate, with a sharp tooth at each corner.

PAREVASPIS BASALIS Ritsema

Kobe, Japan, December, 1911.

XYLOCOPIDÆ

Xylocopa fallax Maidl. *thompsoni* Cockerell, n. race

Male. Length about 25 mm.; anterior wing, 21 mm. (26 mm. in *fallax*); antennæ black; clypeus, except lower margin, semicircular supraclypeal area, lateral face marks, extending up to level of anterior edge of lateral ocelli and then truncate, and semilunar marks enclosing middle ocellus, all cream-color; wings colored nearly as in *X. fallax mcgregori* Ckll., but not brilliant; hair of thorax black with an ochreous band along posterior edge of scutellum, a little on front of tegulæ, and a large reddish ochreous patch on pleura; no light hair on anterior edge of mesonotum; first abdominal segment with ochreous hair at each side; abdomen black, without any metallic color, the hind margins of segments concolorous; legs with black hair; hind femora broad, with a tooth at base.

Type, male, No. 2393, Mus. Calif. Acad. Sci., collected by J. C. Thompson, May, 1907, ten miles east of **Olongopa, Philippine Islands**, 1200 feet altitude. Possibly not more than an individual variation, but apparently a distinct race allied to *mcgregori*, readily separated by the almost entirely pale clypeus, large patch of light hair on pleuræ and the darker hair

of mesonotum anteriorly. Along the anterior edge of mesonotum the hair is pure black, but between this and the bare space is a broad band of obscure reddish hair, which in general view does not affect the prevailing dark appearance. I have one specimen of *mcgregori*, collected at Manila, which has only the broad lower margin of the clypeus black. It differs from the Olongopa bee by the more densely and finely punctured middle of the abdominal segments and the longer (23 mm.) anterior wings, with the basal half beautifully green, though with a purple streak. But another *mcgregori*, also from Manila, has the lower half of the clypeus black and the abdomen punctured as in *thompsoni*. The holotype (female) *mcgregori* belongs with the more closely punctured male, if there is any difference to be recognized in nomenclature. Maidl refers to the denser abdominal punctuation as a good character to separate *X. fallax* from *X. auripennis* Lep., which occurs in Borneo and elsewhere. The wings of *auripennis* are very much more brilliantly colored than those of *thompsoni*.

Evidently the *fallax* group in the Philippine Islands is subject to a good deal of variation, no doubt partly racial and partly individual. To properly elucidate it we should have many specimens from different localities.

NOMADIDÆ

Nomada koreana Cockerell, n. sp.

Female. Length about 7 mm.; anterior wing, 6.2 mm.; ferruginous red with lemon-yellow markings on the abdomen, but not elsewhere; head broad, facial quadrangle about square; eyes red; labrum and the simple mandibles red; antennæ clear red above and below, remarkably long, third joint long but conspicuously shorter than fourth and about as long as fifth; a large black area on upper part of face and extending to front, enclosing a red supraclypeal area; ocelli on a black patch not united with frontal patch; posterior orbits broadly red, but cheeks otherwise black; head and thorax with hardly any hair (perhaps partly denuded); mesothorax dull dusky red, densely punctured, with three black stripes; scutellum clear red, moderately elevated, not distinctly bigibbous; tubercles bright red, but the region in front of them black; a very broad black band from wings to base of middle legs; a black band down middle of metathorax; area of metathorax dull and granular; tegulæ bright ferruginous, punctured; wings brownish, stigma dull ferruginous, nervures fuscous; basal nervure going some distance basad of nervulus; legs clear red, the

femora suffusely blackened at base; spurs yellowish white; anterior coxæ unarmed; abdomen broad, moderately shining; first segment black at base and without yellow; second with a pair of very large pyriform yellow marks, the points directed mesad; marginal region of first three segments somewhat dusky; third segment with a pair of small yellow spots at each side; fourth with a pair of rather large transverse marks, the distance between them much less than the length of one; fifth with a very large quadrate yellow patch, about twice as broad as long; apical lunule or band of hair narrow; venter with small yellow markings.

Type, female, No. 2394, Mus. Calif. Acad. Sci., collected by J. C. Thompson, March 20, 1911, on **Musan Pass, Northern Korea**. This is the first *Nomada* from Korea, but nine species or races are known from Japan, eight from Formosa, one from China, one from Mongolia, and eight from Siberia. The present insect seems nearest to the Japanese *N. ruficornis koebelei* Ckll., var. *a*, and may not be specifically distinct, though var. *a* is probably to be separated from *koebelei*. In Schmiedeknecht's table of European species *N. koreana* runs to *N. jacobaeæ* var. *hæmatodes* Schm., but that has the first segment marked with yellow and the basal nervure meeting the nervulus. Ignoring the lack of hair, it runs to *N. braunsiana* Schm., but is apparently not closely allied. From eastern Siberia another member of this alliance was described as *N. amurensis* Rad., but Friese states that this is really *N. ruficornis* (L.). In the table of British species by Perkins, our insect runs nearest to *N. flava* Panzer, being distinctly related to this rather than to *ruficornis*. Compared with European *N. ruficornis* it has indeed a very different appearance.

MELECTIDÆ

Epeolus tsushimensis Cockerell, n. sp.

Male. Length about 9 mm.; anterior wing, 7 mm.; black without any red markings, but the fourth dorsal tergite, when greatly extended, shows a pale ferruginous base and the fourth sternite and those beyond are reddish clay-color, with appressed yellowish hair, the three curled ventral fringes being also of the same color; face narrowing below, densely covered with silver-white hair; mandibles darker red apically; labrum densely punctured, with a pair of very minute apical denticles, close together; cheeks with thin white hair; antennæ entirely black; a shining space on each side of vertex, but occipital region dull and rugose; mesothorax and scutellum dull, very densely rugosopunctate; the scutellum very coarsely sculptured, ob-

tusely bilobed, the axillæ pointed; upper border of prothorax with cream-colored hair, but no light hair on mesothorax; tubercles margined with white hair; white hair on postscutellum and large tufts behind wings; pleuræ entirely dull and rough; metathorax below the enclosure polished and shining; tegulæ black with the posterior margin dark red; wings dusky, especially apically; nervures and stigma black; basal nervure going very far basad of the nervulus; first recurrent joining second cubital cell before middle; legs with short white hair, a stripe of reddish golden on middle tibiæ; tarsi reddish apically; first two abdominal segments shining and well punctured; following segments duller and more closely punctured; first three segments with felt-like white (slightly creamy) hair bands, broad at sides and narrowing to a point mesad, where the first is very broadly interrupted, the others successively less so; no sign of an anterior band or process of the hairy area; fourth segment basally densely tomentose at sides, and fourth, fifth, and sixth with entire apical white bands; apical plate large, black, broadly rounded.

Type, male, No. 2395, Mus. Calif. Acad. Sci., collected by J. C. Thompson, October 5, 1910, on **Tsu Shima Islands**, between Korea and Japan. A very distinct species known by the simple interrupted bands on the basal abdominal segments. *E. ventralis* Meade-Waldo from near Tientsin, China (F. M. Thompson) is larger with the interrupted band on first tergite bilobed, and markings on mesonotum. The genus seems to be poorly represented in eastern Asia with one species in China, and thence the nearest localities are Assam (1), India (2), Tibet (1), Siberia (2, one of these also at Quetta), and Turkestan (2).

CROCISA JAPONICA Friese

Tsushima, October 5, 1910 (J. C. Thompson). Meyer cites it from the same locality, but also from Sikkhim in the Berlin Museum. The last locality is, I believe, wholly incorrect. I have seen various bees from the Berlin Museum labeled "Sikkhim" which certainly never came from that region. They came in every case, I believe, from the Bingham collection.

CROCISA GEMMATA Cockerell

Guadalcanar, Solomon Islands, four, December, 1920 (J. A. Kusche), one collected by C. H. Froggatt and donated by Dr. E. C. Van Dyke. Previously known from the Solomon Islands, the precise island not specified.

SOME COMPARATIVELY NEW APPLE INSECT
PESTS IN CALIFORNIA

BY ARTHUR D. BORDEN

University of California, Berkeley, California

The apple insect investigations being conducted by the University of California have brought forth some new entomological problems which are of great economic importance to the apple growers of this state. It has been some years since any research work has been conducted in the Sebastopol and Watsonville districts, and new problems have arisen. The growers were at a loss to explain why their recommended spraying practices were not controlling what they thought to be codling moth in the Sebastopol district and skinworm in the Watsonville district.

In Santa Cruz County the insect-bitten or defective fruit ranges from 30 to 60 per cent of the total crop in many orchards. This defect is largely due to tussock moth, skinworm, and leaf-roller injury. In some sections the tussock moth (*Hemerocampa vetusta* Boisduval) has developed a prolonged hatching period from February to August. There are two leaf-rollers active which cause better than 50 per cent of the defect, the common leaf-roller, *Archips argyrosypila* Walker, and a new Tortricid, *Pandemis pyrusana* Kearfoot, which is by far the most injurious and has two broods. It is the larvæ of this second generation which injures so many apples just previous to harvest time. The skinworm, *Argyrotaenia franciscana* Wals., did not appear this year until late July, and has not occasioned the usual heavy loss, though it may show up some in storage within the next few months. Three widely separated infestations of the eye-spotted budmoth, *Tmetocera ocellana* (Scheff.), have been noted and it has proved a serious pest in these orchards. This is the first record of its occurrence in California so far as known. From these observations it is apparent that the control practices will have to be changed to apply to the insects in their order of importance.

In the Sebastopol district the damage to the crop was found not to be so much that of codling moth as of skinworm. This is the first record of its occurrence in this district, though it was found to be already widely distributed. It was first noted on Gravenstein apples in June and July where, in some orchards,

over 25 per cent of the entire crop was injured. Later it appeared on Jonathans, Bellefleurs, Spitzenberg, and Newtown Pippin. In one orchard the damage to the Spitzenberg crop amounted to over 75 per cent of the entire production.

The usual codling moth spray program does not effect control of the skinworm.

Though *Archips argyrosypila* and *Pandemis pyrusana* also occur in this district the degree of infestation is apparently comparatively light.

SWARMING TERMITES

Following the heavy rain of September 30, 1926, I observed next morning a general swarming of the western termite, *Reticulitermes hesperus* Banks, in many parts of Berkeley, California. Quite a number of winged forms were to be seen flying about, though the great majority had cast their wings and were rapidly crawling about on the ground everywhere. One of the most interesting things observed was the pairing of the sexes. They were very numerous, a female closely followed by a male. Often the male held to the posterior end of the female by means of the mandibles, but in all cases the two moved quickly forward or stopped in perfect unison. If the male was driven away it appeared quite excited, while the female usually stopped and held the abdomen in the air. The males seemed to find the females only by chance, and when disturbed would wildly tear around her, often remarkably close, without actually succeeding in relocating her. This was noticed in a number of cases. Rarely a form was observed with one ragged wing which evidently could not be removed. No individuals were seen to be in copulation: this, according to Dr. S. F. Light, had already occurred, and the males were simply following the females in search of a suitable place for founding a new colony. The weather was warm and bright. Not a single individual was to be found on the next day in Berkeley. Leslie M. Smith noted large numbers of cast wings and a goodly number of dealated sex forms about Mount Tamalpais on October 3, so that the swarming must have occurred over a large area. At dusk on the same day also a few specimens of the large termite, *Termopsis angusticollis* Hagen, were seen flying about at Berkeley.

—E. O. Essig.

VARIATIONS IN THE SEASONAL DEVELOPMENT OF THE WALNUT CODLING MOTH AND ITS HOST AS INFLUENCED BY TEMPERATURE

BY STANLEY E. FLANDERS

Saticoy, California

In the walnut-growing district of Saticoy, California, the seasons of 1925 and 1926 were in marked contrast to each other. In 1925, a big crop year, the trees came out of the dormant period uniformly and early in May were well foliated throughout the whole area. The following season opposite conditions prevailed. There was a small crop, and the foliage appeared very irregularly and generally late. In orchards nearer the coast many branches were bare of leaves until July.

The development of the codling moth during these two seasons was not synchronous with that of its host. The first year was characterized by the late appearance of the moths and an early crop of nuts; the next by the early appearance of the moths and a late crop of nuts. A noticeable result was that the "June drop" of immature and diseased nuts were more heavily infested with larvæ in 1926 than in 1925, a codling moth year.

Winter temperatures appear to be responsible for these variations. Apparently the minimum temperatures during the months of December, January, February, March, and April regulate the appearance of the foliage in the spring, and the accumulated effective temperatures during the same period determine the appearance of the overwintering brood of moths.

The temperature relations of the seasons of 1924-5 and 1925-6 are given in the following tables.

	Mean Monthly Temperatures					Classified Hourly Temperatures		
	Dec.	Jan.	Feb.	Mar.	Apr.	Below 32	Below 35	Below 50
1924-5	49.3	51.4	52.8	53.6	57.6	27 hrs.	80 hrs.	1447 hrs.
1925-6	57.3	51.6	56.4	58.4	60.6	0 hrs.	5 hrs.	925 hrs.

If 50 degrees (F) is taken as the threshold of development of the moth, then there were at least 522 more hours of effective temperatures in 1925-6 than in 1924-5. This would account for the early appearance of the moths in 1926. The peak of pupation of the overwintering brood in 1925 occurred on May 17, whereas in 1926 it occurred on April 21, 624 hours earlier.

The early appearance of the moths in 1926 indicated a severe infestation later in the season, owing to the possibility of two full broods. The months of May, June, and July, however, were cool, and development in the pupa and egg stages was retarded. The pupal periods for most of the 1223 pupæ in the laboratory *fluctuated* between twenty-four and twenty-six days in length. In 1925 the pupal periods of 364 pupæ *gradually decreased* from thirty-three days in April to seventeen days in June. Owing to the low evening temperatures, as many eggs were deposited before 4 p. m. as after. In 1925 most of the eggs were deposited after 5 p. m.

Contrary to expectations, 20 per cent of the larvæ leaving the nuts during the first week in July constructed overwintering cocoons. During the last week in July 50 per cent of the larvæ constructed overwintering cocoons. A partial second brood somewhat larger than in 1925 is expected.

A cold winter followed by a warm spring and summer creates conditions most favorable for the increase of the moth, while a mild winter followed by a cool spring and summer creates conditions most unfavorable. The walnut tree is affected in the same way, so that a large crop may show a heavy infestation and a small crop a light infestation, as occurred in 1925 and 1926.

A GENEROUS GIFT TO THE ACADEMY

Mr. C. L. Fox has returned from a three months' visit to his old home in Devonshire, England. While there he collected extensively for the entomological department of the California Academy of Sciences and brought back nearly three thousand insects from the British Islands. The orders Diptera and Hymenoptera were best represented, but there were some very interesting Coleoptera, Hemiptera and Lepidoptera, the latter including a beautiful specimen of the death's head hawkmoth, a species before wanting in the Academy collection. With these insects taken by him he brought a fine series of determined British Hymenoptera kindly presented by Mr. R. C. L. Perkins and some determined beetles presented by Mr. J. H. Keys. These British insects are most welcome, as the Academy collection is still weak in European insects.

THE PAN-PACIFIC ENTOMOLOGIST

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E. P. VAN DUZEE, Editor S. B. FREEBORN, Ph.D., Treasurer

Dr. Stanley B. Freeborn of the University of California College of Agriculture at Davis, California, has arranged to take over the duties of treasurer of the Pan-Pacific Entomologist beginning December 1, 1926, instead of January 1, 1927, as heretofore announced. His correct address will be at Davis, California, and not at Berkeley, and will be found on the inside of the front cover of this number. Subscribers and correspondents will kindly note the change.

Prof. M. W. Blackman of the New York State College of Forestry at Syracuse, is spending his sabbatical year at Stanford University studying certain groups of the Scolytidæ.

Two important entomological works have reached us recently that will be of interest to our readers. Of more direct appeal to western workers is the book on the *Insects of Western North America* by Prof. E. O. Essig of the University of California.¹ In this he has given us the first general guide to our western insects, and in so doing he has filled a long-felt want and has earned the gratitude of every entomologist and agriculturist on the west coast. Professor Essig's book is a comprehensive treatise on western insects with keys to the families and higher groups. Under each family is given the general characteristics of the insects comprised within it, with an enumeration of all or most of the best known species from the Pacific slope. Sufficient descriptive notes on each species are given, so it can be recognized with reasonable certainty. Both Latin and English names are included and there are numerous illustrations to assist in the recognition of the more important species. Life history notes are included for a considerable proportion of the species, with control measures for those that are injurious.

In addition to the insects the work treats quite fully of the mites and ticks, and briefly mentions other groups of the Arthropoda. Used in connection with Comstock's *Introduction* or Kellogg's *American Insects*, it will enable the beginner

¹ *Insects of Western North America*: By E. O. Essig. New York, The Macmillan Company, 1926, 8vo., ix, 1035 pages. \$10.

to identify a large number of the insects he will find about his home or on his week-end trips. The very complete bibliographical references, appended as footnotes throughout the work, will be appreciated by everyone using the book, but especially by the agriculturist who needs the fullest information regarding his insect enemies.

This book, comprising over 1000 pages, is well printed on good paper, and in mechanical perfection fully upholds the Macmillan standard. It is really in a class by itself, as no other work yet published even attempts to cover the same ground, and it is absolutely indispensable to anyone wishing to become acquainted with our western insects.

Of more interest to the general systematist is W. S. Blatchley's *Heteroptera of the Eastern United States*.² Professor Blatchley tells us that this is the last of his series of manuals on the insects of Indiana and the eastern United States, and as a faunal guide it fully sustains the high mark of usefulness set by his *Coleoptera of Indiana*. It is a large octavo book of about 1100 pages, clearly printed and well illustrated, and places the study of our eastern Heteroptera, to which suborder it is confined, on a plane with that of the eastern Coleoptera, where the instructor and general entomologist can determine most of his captures. Of even more interest are the very full biological data. These data not only include an extensive compilation from the literature of these insects, but the author has added his own collection notes, which serve to extend our knowledge of many of the species. The nomenclature used seems to be well up to date. The changes that will be required later will mostly represent the growth of our knowledge of this order of insects. There is little conflict between this work and Doctor Britton's *Hemiptera of Connecticut*, the only previous work that covers this ground at all. The two should be used together, as they supplement one another. This manual of the eastern Heteroptera represents a vast amount of patient study and research, through a large and scattered literature, and we must feel grateful to Professor Blatchley for having done it for us and for having done it so well.

² *Heteroptera or True Bugs of Eastern North America*: By W. S. Blatchley. Indianapolis, Indiana, The Nature Publishing Company, 1926, 8vo., 1116 pages. \$10.